

# SEQUENCE LISTING

<110> Lowe, Keith S.  
Gordon-Kamm, William J.  
Klein, Theodore M.  
Rasco-Gaunt, Sonriza  
Cahoon, Rebecca E.  
Sun, Xifan  
Hoerster, George J.  
Gregory, Carolyn A.  
Nadimpalli, Ramgopal

<120> Transcriptional Activator Nucleic Acids,  
Polypeptides, and Methods of Use Thereof

<130> 0943

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<151> 1998-11-09

<160> 23

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      Met Asp Ser Ser Phe Leu Pro Ala Ala Gly Ala Glu Asn
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ggc tcg gcg gcg ggc ggc gcc aac aat ggc ggc gct gct cag cag cat      158
Gly Ser Ala Ala Gly Gly Ala Asn Asn Gly Gly Ala Ala Gln Gln His
      15             20             25             30

gcg gcg ccg gcg atc cgc gag cag gac cgg ctg atg ccg atc gcg aac      206
Ala Ala Pro Ala Ile Arg Glu Gln Asp Arg Leu Met Pro Ile Ala Asn
          35             40             45

gtg atc cgc atc atg cgg cgc gtg ctg ccg gcg cac gcc aag atc tcg      254
Val Ile Arg Ile Met Arg Arg Val Leu Pro Ala His Ala Lys Ile Ser
          50             55             60

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Asp Asp Ala Lys Glu Thr Ile Gln Glu Cys Val Ser Glu Tyr Ile Ser
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ttc atc acg ggg gag gcc aac gag cgg tgc cag cgg gag cag cgc aag      350
Phe Ile Thr Gly Glu Ala Asn Glu Arg Cys Gln Arg Glu Gln Arg Lys
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acc atc acc gcc gag gac gtg ctg tgg gcc atg agc cgc ctc ggc ttc      398
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Thr Ile Thr Ala Glu Asp Val Leu Trp Ala Met Ser Arg Leu Gly Phe  
 95 100 105 110

gac gac tac gtc gag ccg ctc ggc gcc tac ctc cac cgc tac cgc gag 446  
 Asp Asp Tyr Val Glu Pro Leu Gly Ala Tyr Leu His Arg Tyr Arg Glu  
 115 120 125

ttc gag ggc gac gcg cgc ggc gtc ggg ctc gtc ccg ggg gcc gcc cca 494  
 Phe Glu Gly Asp Ala Arg Gly Val Gly Leu Val Pro Gly Ala Ala Pro  
 130 135 140

tcg cgc ggc ggc gac cac cac ccg cac tcc atg tcg cca gcg gcg atg 542  
 Ser Arg Gly Gly Asp His His Pro His Ser Met Ser Pro Ala Ala Met  
 145 150 155

ctc aag tcc cgc ggg cca gtc tcc gga gcc gcc atg cta ccg cac cac 590  
 Leu Lys Ser Arg Gly Pro Val Ser Gly Ala Ala Met Leu Pro His His  
 160 165 170

cac cac cac cac gac atg cag atg cac gcc gcc atg tac ggg gga acg 638  
 His His His His Asp Met Gln Met His Ala Ala Met Tyr Gly Gly Thr  
 175 180 185 190

gcc gtg ccc ccg ccg gcc ggg cct cct cac cac ggc ggg ttc ctc atg 686  
 Ala Val Pro Pro Pro Ala Gly Pro Pro His His Gly Gly Phe Leu Met  
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 Thr Tyr Gly Gly Glu His Ala Met Ala Ala Tyr Tyr Gly Gly Ala Ala  
 225 230 235

tac gcg ccc ggc aac ggc ggg agc ggc gac ggc agt ggc agt ggc ggc 830  
 Tyr Ala Pro Gly Asn Gly Gly Ser Gly Asp Gly Ser Gly Ser Gly Gly  
 240 245 250

ggt ggc ggg agc gcg tcg cac aca ccg cag ggc agc ggc ggc ttg gag 878  
 Gly Gly Gly Ser Ala Ser His Thr Pro Gln Gly Ser Gly Gly Leu Glu  
 255 260 265 270

cac ccg cac ccg ttc gcg tac aag tagctagttc gtacgtcggt cgacttgagc 932  
 His Pro His Pro Phe Ala Tyr Lys  
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aagccatcga tctgctgac tgaacgtacg ctgtattgta cacgcatgca cgtacgtatc 992  
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| 20                              | 25                                  | 30  |
| Pro Ala Ile Arg Glu Gln Asp     | Arg Leu Met Pro Ile Ala Asn Val Ile |     |
| 35                              | 40                                  | 45  |
| Arg Ile Met Arg Arg Val Leu Pro | Ala His Ala Lys Ile Ser Asp Asp     |     |
| 50                              | 55                                  | 60  |
| Ala Lys Glu Thr Ile Gln Cys Val | Ser Glu Tyr Ile Ser Phe Ile         |     |
| 65                              | 70                                  | 75  |
| Thr Gly Glu Ala Asn Glu Arg Cys | Gln Arg Glu Gln Arg Lys Thr Ile     |     |
| 85                              | 90                                  | 95  |
| Thr Ala Glu Asp Val Leu Trp Ala | Met Ser Arg Leu Gly Phe Asp Asp     |     |
| 100                             | 105                                 | 110 |
| Tyr Val Glu Pro Leu Gly Ala Tyr | Leu His Arg Tyr Arg Glu Phe Glu     |     |
| 115                             | 120                                 | 125 |
| Gly Asp Ala Arg Gly Val Gly Leu | Val Pro Gly Ala Ala Pro Ser Arg     |     |
| 130                             | 135                                 | 140 |
| Gly Gly Asp His His Pro His Ser | Met Ser Pro Ala Ala Met Leu Lys     |     |
| 145                             | 150                                 | 155 |
| Ser Arg Gly Pro Val Ser Gly Ala | Ala Met Leu Pro His His His His     |     |
| 165                             | 170                                 | 175 |
| His His Asp Met Gln Met His Ala | Ala Met Tyr Gly Gly Thr Ala Val     |     |
| 180                             | 185                                 | 190 |
| Pro Pro Pro Ala Gly Pro Pro His | Gly Gly Phe Leu Met Pro His         |     |
| 195                             | 200                                 | 205 |
| Pro Gln Gly Ser Ser His Tyr Leu | Pro Tyr Ala Tyr Glu Pro Thr Tyr     |     |
| 210                             | 215                                 | 220 |
| Gly Gly Glu His Ala Met Ala Ala | Tyr Tyr Gly Gly Ala Ala Tyr Ala     |     |
| 225                             | 230                                 | 235 |
| Pro Gly Asn Gly Gly Ser Gly Asp | Gly Ser Gly Ser Gly Gly Gly Gly     |     |
| 245                             | 250                                 | 255 |
| Gly Ser Ala Ser His Thr Pro Gln | Gly Ser Gly Gly Leu Glu His Pro     |     |
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| His Pro Phe Ala Tyr Lys         |                                     |     |
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Gly Gly Gly Gly Gly Ser Gly Gly Gly Phe His Gly Tyr Gln Lys Leu  
5 10 15 20

103

cca aaa tca aac tcc gct gga atg atg ctc tcg gag cta tcg aat aac  
Pro Lys Ser Asn Ser Ala Gly Met Met Leu Ser Glu Leu Ser Asn Asn  
25 30 35

151

aac aac aat att gac gta aac tct aca tgt act gta cga gag caa gat  
Asn Asn Asn Ile Asp Val Asn Ser Thr Cys Thr Val Arg Glu Gln Asp  
40 45 50

199

cga tac atg cca att gct aat gtg atc agg atc atg cgt aag gta ctt  
Arg Tyr Met Pro Ile Ala Asn Val Ile Arg Ile Met Arg Lys Val Leu  
55 60 65

247

cct act cat gcc aag atc tct gac gat gcc aaa gaa act atc caa gaa  
Pro Thr His Ala Lys Ile Ser Asp Asp Ala Lys Glu Thr Ile Gln Glu  
70 75 80

295

tgt gtc tca gaa tac atc agt ttc atc aca agt gaa gcc aat gat cgt  
Cys Val Ser Glu Tyr Ile Ser Phe Ile Thr Ser Glu Ala Asn Asp Arg  
85 90 95 100

343

tgc caa cgt gaa caa aga aag aca atc aca gct gaa gat gtt tta tgg  
Cys Gln Arg Glu Gln Arg Lys Thr Ile Thr Ala Glu Asp Val Leu Trp  
105 110 115

391

gcg atg agc aaa cta ggg ntt gat gag tac att gaa cct cta act ctt 439  
 Ala Met Ser Lys Leu Gly Xaa Asp Glu Tyr Ile Glu Pro Leu Thr Leu  
                   120                                  125                                  130

tac ctt caa cgt tat cgt gag ttt gaa ggt gna cgt tgg tca 481  
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                   35                                  40                                  45  
 Arg Glu Gln Asp Arg Tyr Met Pro Ile Ala Asn Val Ile Arg Ile Met  
                   50                                  55                                  60  
 Arg Lys Val Leu Pro Thr His Ala Lys Ile Ser Asp Asp Ala Lys Glu  
                   65                                  70                                  75                                  80  
 Thr Ile Gln Glu Cys Val Ser Glu Tyr Ile Ser Phe Ile Thr Ser Glu  
                   85                                  90                                  95  
 Ala Asn Asp Arg Cys Gln Arg Glu Gln Arg Lys Thr Ile Thr Ala Glu  
                   100                                  105                                  110  
 Asp Val Leu Trp Ala Met Ser Lys Leu Gly Xaa Asp Glu Tyr Ile Glu  
                   115                                  120                                  125  
 Pro Leu Thr Leu Tyr Leu Gln Arg Tyr Arg Glu Phe Glu Gly Xaa Arg  
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 Trp Ser  
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   Thr Ser Ser Leu Ile Ile Thr His Thr Pro Thr Leu Ile Ala Met  
   1                                  5                                  10                                  15

gaa act gga ggc ttt cac ggc tac cgc aag ctc ccc aac acc acc gct 95  
 Glu Thr Gly Gly Phe His Gly Tyr Arg Lys Leu Pro Asn Thr Thr Ala  
                   20                                  25                                  30

ggg ttg aag ctg tca gtg tca gac atg aac atg agg cag cag gta gca 143  
 Gly Leu Lys Leu Ser Val Ser Asp Met Asn Met Arg Gln Gln Val Ala  
                   35                                  40                                  45

|  |     |
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| tca tca gat cac agt gca gcc aca gga gag gag aac gaa tgc acg gtg<br>Ser Ser Asp His Ser Ala Ala Thr Gly Glu Glu Asn Glu Cys Thr Val | 191 |
| 50 55 60   |     |
| agg gag caa gac agg ttc atg cca atc gcc aac gtg att agg atc atg<br>Arg Glu Gln Asp Arg Phe Met Pro Ile Ala Asn Val Ile Arg Ile Met | 239 |
| 65 70 75   |     |
| cgc aag att ctc cct cca cac gca aaa atc tcg gac gat gca aaa gaa<br>Arg Lys Ile Leu Pro Pro His Ala Lys Ile Ser Asp Asp Ala Lys Glu | 287 |
| 80 85 90 95  |     |
| aca atc caa gag tgc gtg tct gag tac atc agc ttc atc aca ggt gag<br>Thr Ile Gln Glu Cys Val Ser Glu Tyr Ile Ser Phe Ile Thr Gly Glu | 335 |
| 100 105 110  |     |
| gcg aac gag cgt tgc cag agg gag cag cgg aag acc ata acc gca gag<br>Ala Asn Glu Arg Cys Gln Arg Glu Gln Arg Lys Thr Ile Thr Ala Glu | 383 |
| 115 120 125  |     |
| gac gtg ctt tgg gcc atg agc aag ctt gga ttc gac gac tac atc gaa<br>Asp Val Leu Trp Ala Met Ser Lys Leu Gly Phe Asp Asp Tyr Ile Glu | 431 |
| 130 135 140  |     |
| ccg ttg acc atg tac ctt cac cgc tac cgt gaa ctt gag ggt gac cgc<br>Pro Leu Thr Met Tyr Leu His Arg Tyr Arg Glu Leu Glu Gly Asp Arg | 479 |
| 145 150 155  |     |
| acc tct atg agg ggt gaa cca ctc ggg aag agg act gtg gaa tac gcc<br>Thr Ser Met Arg Gly Glu Pro Leu Gly Lys Arg Thr Val Glu Tyr Ala | 527 |
| 160 165 170 175  |     |
| acg ctt ggt gtt gct act gct ttt gtc cct cca ccc tat cat cac cac<br>Thr Leu Gly Val Ala Thr Ala Phe Val Pro Pro Pro Tyr His His His | 575 |
| 180 185 190  |     |
| aat ggg tac ttt ggt gct gcc atg ccc atg ggg act tac gtt agg gaa<br>Asn Gly Tyr Phe Gly Ala Ala Met Pro Met Gly Thr Tyr Val Arg Glu | 623 |
| 195 200 205  |     |
| gcg cca cca aat aca gcc tcc tcc cat cac cac cac cac cac cac cac<br>Ala Pro Pro Asn Thr Ala Ser Ser His His His His His His His His | 671 |
| 210 215 220  |     |
| cac cat gct cgt gga atc tcc aat gct cat gaa cca aat gct cgc tcc<br>His His Ala Arg Gly Ile Ser Asn Ala His Glu Pro Asn Ala Arg Ser | 719 |
| 225 230 235  |     |
| ata taaaattata taattatgac taggattcag aacaagactt gatgatgatt<br>Ile  | 772 |
| 240  |     |
| agcttaactc tcagtaattg gtgctagagt actactgttg ttgaggatac tttattttat  | 832 |
| aattaagggc tgggaaggga gttagtatat tcctaatect aactatgtgc atctttaatt  | 892 |
| tatgaaatca ctttgtttta acctttgatg aaaaaaaaaa aaaaaaaaaa   | 942 |

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|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 | 2060 | 2061 | 2062 | 2063 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 | 2070 | 2071 | 2072 | 2073 | 2074 | 2075 | 2076 | 2077 | 2078 | 2079 | 2080 | 2081 | 2082 | 2083 | 2084 | 2085 | 2086 | 2087 | 2088 | 2089 | 2090 | 2091 | 2092 | 2093 | 2094 | 2095 | 2096 | 2097 | 2098 | 2099 |      |

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                   115                  120                  125  
 Leu Thr Val Tyr Leu His Arg Tyr Arg Glu Phe Asp Gly Gly Glu Arg  
                   130                  135                  140  
 Gly Ser Ile Arg Gly Glu Pro Leu Val Lys Arg Ser Thr Ser Asp Pro  
 145                  150                  155                  160  
 Gly His Phe Gly Met Ala Ser Phe Val Pro Ala Phe His Met Gly His  
                   165                  170                  175  
 His Asn Gly Phe Phe Gly Pro Ala Ser Ile Gly Gly Phe Leu Lys Asp  
                   180                  185                  190  
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| 1                  5                  10                  15    |     |
| cgc ctc ggc ttc gac gac tac gtc gcg ccc ctc ggc gcc ttc ctc cag | 96  |
| Arg Leu Gly Phe Asp Asp Tyr Val Ala Pro Leu Gly Ala Phe Leu Gln |     |
| 20                  25                  30                      |     |
| cgc atg cgc gac gac agc gac cac ggc ggt gaa gag cgc ggc ggc cct | 144 |
| Arg Met Arg Asp Asp Ser Asp His Gly Gly Glu Glu Arg Gly Gly Pro |     |
| 35                  40                  45                      |     |
| gca ggg cgt ggt ggc tcg cgc cgc ggc tcg tcg tcc ttg ccg ctc cac | 192 |
| Ala Gly Arg Gly Gly Ser Arg Arg Gly Ser Ser Ser Leu Pro Leu His |     |
| 50                  55                  60                      |     |
| tgc ccg cag cag atg cac cac ctg cac cca gcc gtc tgc cgg cgt ccg | 240 |
| Cys Pro Gln Gln Met His His Leu His Pro Ala Val Cys Arg Arg Pro |     |
| 65                  70                  75                  80  |     |
| cac cag agc gtg tcg cct gct gca gga tac gcc gtc cgg ccc gtt ccc | 288 |
| His Gln Ser Val Ser Pro Ala Ala Gly Tyr Ala Val Arg Pro Val Pro |     |
| 85                  90                  95                      |     |
| cgc ccg atg cca gcc cgt ggg tac cgc atg cag ggc gga gac cac cgc | 336 |
| Arg Pro Met Pro Ala Arg Gly Tyr Arg Met Gln Gly Gly Asp His Arg |     |
| 100                  105                  110                   |     |
| agc gtg ggc ggc gtg gct ccc tgc agc tac gga ggg gcg ctc gtc cag | 384 |
| Ser Val Gly Gly Val Ala Pro Cys Ser Tyr Gly Gly Ala Leu Val Gln |     |
| 115                  120                  125                   |     |
| gcc ggt gga acc caa cac gtt gtt gga ttc cac gac gac gag gca agc | 432 |
| Ala Gly Gly Thr Gln His Val Val Gly Phe His Asp Asp Glu Ala Ser |     |
| 130                  135                  140                   |     |

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 Ser Ser Ser Glu Asn Pro Pro Pro Glu Gly Arg Ala Ala Gly Ser Asn  
 145 150 155 160

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 agctggtgca cgccgccac ctgcgccgac gtcgccgtcg tcgtcgcat ggacttaacc 660  
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 Arg Met Arg Asp Asp Ser Asp His Gly Gly Glu Glu Arg Gly Gly Pro  
 35 40 45  
 Ala Gly Arg Gly Gly Ser Arg Arg Gly Ser Ser Ser Leu Pro Leu His  
 50 55 60  
 Cys Pro Gln Gln Met His His Leu His Pro Ala Val Cys Arg Arg Pro  
 65 70 75 80  
 His Gln Ser Val Ser Pro Ala Ala Gly Tyr Ala Val Arg Pro Val Pro  
 85 90 95  
 Arg Pro Met Pro Ala Arg Gly Tyr Arg Met Gln Gly Gly Asp His Arg  
 100 105 110  
 Ser Val Gly Gly Val Ala Pro Cys Ser Tyr Gly Gly Ala Leu Val Gln  
 115 120 125  
 Ala Gly Gly Thr Gln His Val Val Gly Phe His Asp Asp Glu Ala Ser  
 130 135 140  
 Ser Ser Ser Glu Asn Pro Pro Pro Glu Gly Arg Ala Ala Gly Ser Asn  
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 Met Asn Asn Pro Gln Asn Pro Lys Ala Ser Ala Pro Cys Thr Leu  
 1 5 10 15

cca ccg gag ctt ccc aaa gaa gca gtg gcg acc gac gaa gca ccg ccg 95  
 Pro Pro Glu Leu Pro Lys Glu Ala Val Ala Thr Asp Glu Ala Pro Pro  
 20 25 30

cca atg ggc aac aac aac aac acg gaa tcg gcg acg gcg acg atg gtc 143  
 Pro Met Gly Asn Asn Asn Asn Thr Glu Ser Ala Thr Ala Thr Met Val

| 35  | 40 | 45 |     |
|---|----|----|-----|
| cgg gag cag gac cgg ctg atg ccc gtg gcc aac gtg tcc cgc atc atg<br>Arg Glu Gln Asp Arg Leu Met Pro Val Ala Asn Val Ser Arg Ile Met<br>50 55 60        |    |    | 191 |
| cgc caa gtg ctg cct ccg tac gcc aag atc tcc gac gac gcc can gaa<br>Arg Gln Val Leu Pro Pro Tyr Ala Lys Ile Ser Asp Asp Ala Xaa Glu<br>65 70 75        |    |    | 239 |
| gtg atc caa gaa ttg ctn ttc gga att tca tca ctt ncg tcc tgg cga<br>Xaa Ile Gln Glu Leu Xaa Phe Gly Ile Ser Ser Leu Xaa Ser Trp Arg<br>80 85 90 95     |    |    | 287 |
| ggc gaa acg aag cgg tgc cac acc gag cgc cgc aag acc gtc acc tcc<br>Gly Glu Thr Lys Arg Cys His Thr Glu Arg Arg Lys Thr Val Thr Ser<br>100 105 110     |    |    | 335 |
| gaa gac atc gtg tgg gcc atg agc cgc ctc ggc ttc gac gac tac gtc<br>Glu Asp Ile Val Trp Ala Met Ser Arg Leu Gly Phe Asp Asp Tyr Val<br>115 120 125     |    |    | 383 |
| gcg ccc ctc ggc gcc ttc ctc cag cgc atg cgc gac nac agc gaa cac<br>Ala Pro Leu Gly Ala Phe Leu Gln Arg Met Arg Asp Xaa Ser Glu His<br>130 135 140     |    |    | 431 |
| ggg ggt gaa aac gcg gcg gcc tgc ang ggg tng tgg tcn cgc cgc ggg<br>Gly Gly Glu Asn Ala Ala Ala Cys Xaa Gly Xaa Trp Xaa Arg Arg Gly<br>145 150 155     |    |    | 479 |
| tcg tct nct tgg cgc tcc ctt gcc gca ana gat gac aac ttg cac caa<br>Ser Ser Xaa Trp Arg Ser Leu Ala Ala Xaa Asp Asp Asn Leu His Gln<br>160 165 170 175 |    |    | 527 |
| acg tct gcc ggg ntc gga cca aaa ctn ttc cct gtt gca gga ata ccc<br>Thr Ser Ala Gly Xaa Gly Pro Lys Xaa Phe Pro Val Ala Gly Ile Pro<br>180 185 190     |    |    | 575 |
| gtc cng ggc cnt tcc ccc ccn aat cca acc att tgg ttt ccc ctt gc<br>Val Xaa Gly Xaa Ser Pro Xaa Asn Pro Thr Ile Trp Phe Pro Leu<br>195 200 205          |    |    | 622 |

<210> 16  
 <211> 206  
 <212> PRT  
 <213> Zea mays  
  
 <220>  
 <221> VARIANT  
 <222> (1)...(206)  
 <223> Xaa = Any Amino Acid

<400> 16  
 Met Asn Asn Pro Gln Asn Pro Lys Ala Ser Ala Pro Cys Thr Leu Pro  
 1 5 10 15  
 Pro Glu Leu Pro Lys Glu Ala Val Ala Thr Asp Glu Ala Pro Pro Pro  
 20 25 30  
 Met Gly Asn Asn Asn Asn Thr Glu Ser Ala Thr Ala Thr Met Val Arg  
 35 40 45  
 Glu Gln Asp Arg Leu Met Pro Val Ala Asn Val Ser Arg Ile Met Arg  
 50 55 60

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gln | Val | Leu | Pro | Pro | Tyr | Ala | Lys | Ile | Ser | Asp | Asp | Ala | Xaa | Glu | Xaa | 65  | 70  | 75  | 80  |
| Ile | Gln | Glu | Leu | Xaa | Phe | Gly | Ile | Ser | Ser | Leu | Xaa | Ser | Trp | Arg | Gly | 85  | 90  | 95  |     |
| Glu | Thr | Lys | Arg | Cys | His | Thr | Glu | Arg | Arg | Lys | Thr | Val | Thr | Ser | Glu | 100 | 105 | 110 |     |
| Asp | Ile | Val | Trp | Ala | Met | Ser | Arg | Leu | Gly | Phe | Asp | Asp | Tyr | Val | Ala | 115 | 120 | 125 |     |
| Pro | Leu | Gly | Ala | Phe | Leu | Gln | Arg | Met | Arg | Asp | Xaa | Ser | Glu | His | Gly | 130 | 135 | 140 |     |
| Gly | Glu | Asn | Ala | Ala | Ala | Cys | Xaa | Gly | Xaa | Trp | Xaa | Arg | Arg | Gly | Ser | 145 | 150 | 155 | 160 |
| Ser | Xaa | Trp | Arg | Ser | Leu | Ala | Ala | Xaa | Asp | Asp | Asn | Leu | His | Gln | Thr | 165 | 170 | 175 |     |
| Ser | Ala | Gly | Xaa | Gly | Pro | Lys | Xaa | Phe | Pro | Val | Ala | Gly | Ile | Pro | Val | 180 | 185 | 190 |     |
| Xaa | Gly | Xaa | Ser | Pro | Xaa | Asn | Pro | Thr | Ile | Trp | Phe | Pro | Leu |     |     | 195 | 200 | 205 |     |

<210> 17  
 <211> 1121  
 <212> DNA  
 <213> Glycine max  
  
 <220>  
 <221> CDS  
 <222> (3)...(1121)

|   |     |
|---|-----|
| gc acg agg gaa act gga ggc ttt cat ggc tac cgc aag ctc ccc aac  | 47  |
| Thr Arg Glu Thr Gly Gly Phe His Gly Tyr Arg Lys Leu Pro Asn     |     |
| 1 5 10 15   |     |
| aca acc tct ggg ttg aag ctg tca gtg tca gac atg aac atg aac atg | 95  |
| Thr Thr Ser Gly Leu Lys Leu Ser Val Ser Asp Met Asn Met Asn Met |     |
| 20 25 30  |     |
| agg cag cag cag gta gca tca tca gat cag aac tgc agc aac cac agt | 143 |
| Arg Gln Gln Gln Val Ala Ser Ser Asp Gln Asn Cys Ser Asn His Ser |     |
| 35 40 45  |     |
| gca gca gga gag gag aac gaa tgc acg gtg agg gag caa gac agg ttc | 191 |
| Ala Ala Gly Glu Glu Asn Glu Cys Thr Val Arg Glu Gln Asp Arg Phe |     |
| 50 55 60  |     |
| atg cca atc gct aac gtg ata cgg atc atg cgc aag att ctc cct cca | 239 |
| Met Pro Ile Ala Asn Val Ile Arg Ile Met Arg Lys Ile Leu Pro Pro |     |
| 65 70 75  |     |
| cac gca aaa atc tcc gat gat gca aag gag aca atc caa gag tgc gtg | 287 |
| His Ala Lys Ile Ser Asp Asp Ala Lys Glu Thr Ile Gln Glu Cys Val |     |
| 80 85 90 95   |     |
| tcg gag tac atc agc ttc atc acc ggg gag gcc aac gag cgt tgc cag | 335 |
| Ser Glu Tyr Ile Ser Phe Ile Thr Gly Glu Ala Asn Glu Arg Cys Gln |     |
| 100 105 110   |     |
| agg gag cag cgc aag acc ata acc gca gag gac gtg ctt tgg gca atg | 383 |
| Arg Glu Gln Arg Lys Thr Ile Thr Ala Glu Asp Val Leu Trp Ala Met |     |
| 115 120 125   |     |
| agt aag ctt gga ttc gac gac tac atc gaa ccg tta acc atg tac ctt | 431 |



<210> 18  
 <211> 355  
 <212> PRT  
 <213> Glycine max

<400> 18

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Thr | Arg | Glu | Thr | Gly | Gly | Phe | His | Gly | Tyr | Arg | Lys | Leu | Pro | Asn | Thr |
| 1   |     |     |     | 5   |     |     |     | 10  |     |     |     |     |     | 15  |     |
| Thr | Ser | Gly | Leu | Lys | Leu | Ser | Val | Ser | Asp | Met | Asn | Met | Asn | Met | Arg |
|     |     | 20  |     |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Gln | Gln | Gln | Val | Ala | Ser | Ser | Asp | Gln | Asn | Cys | Ser | Asn | His | Ser | Ala |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Ala | Gly | Glu | Glu | Asn | Glu | Cys | Thr | Val | Arg | Glu | Gln | Asp | Arg | Phe | Met |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Pro | Ile | Ala | Asn | Val | Ile | Arg | Ile | Met | Arg | Lys | Ile | Leu | Pro | Pro | His |
|     |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |
| Ala | Lys | Ile | Ser | Asp | Asp | Ala | Lys | Glu | Thr | Ile | Gln | Glu | Cys | Val | Ser |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Glu | Tyr | Ile | Ser | Phe | Ile | Thr | Gly | Glu | Ala | Asn | Glu | Arg | Cys | Gln | Arg |
|     |     |     | 100 |     |     |     | 105 |     |     |     |     |     | 110 |     |     |
| Glu | Gln | Arg | Lys | Thr | Ile | Thr | Ala | Glu | Asp | Val | Leu | Trp | Ala | Met | Ser |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Lys | Leu | Gly | Phe | Asp | Asp | Tyr | Ile | Glu | Pro | Leu | Thr | Met | Tyr | Leu | His |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Arg | Tyr | Arg | Glu | Leu | Glu | Gly | Asp | Arg | Thr | Ser | Met | Arg | Gly | Glu | Pro |
|     |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Leu | Gly | Lys | Arg | Thr | Val | Glu | Tyr | Ala | Thr | Leu | Ala | Thr | Ala | Phe | Val |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Pro | Pro | Pro | Phe | His | His | His | Asn | Gly | Tyr | Phe | Gly | Ala | Ala | Met | Pro |
|     |     |     | 180 |     |     |     | 185 |     |     |     |     |     |     | 190 |     |
| Met | Gly | Thr | Tyr | Val | Arg | Glu | Thr | Pro | Pro | Asn | Ala | Ala | Ser | Ser | His |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| His | His | His | Gly | Ile | Ser | Asn | Ala | His | Glu | Pro | Asn | Ala | Arg | Ser | Ile |
|     |     | 210 |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Asn | Arg | Val | Leu | Phe | Ser | Arg | Arg | Thr | Arg | Leu | Leu | Gly | Leu | Asp | Leu |
|     |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| Asn | Ser | Gln | Leu | Val | Leu | Glu | Tyr | Cys | Cys | Gly | Trp | Leu | Ile | Leu | Leu |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Arg | Ala | Gly | Asn | Trp | Gly | Val | Ser | Ile | Tyr | Ser | Ser | Leu | Cys | Ala | Ser |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Leu | Ile | Tyr | Gly | Ile | Thr | Leu | Phe | Phe | Val | Leu | Thr | Ser | Asp | Asn | Leu |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Asp | Phe | Leu | Met | Phe | Asn | Val | Val | Leu | Ser | Ile | Pro | Tyr | Gln | Cys | Gln |
|     |     | 290 |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Ala | Gly | Phe | Ser | His | Ala | Pro | Lys | Trp | Asn | Thr | Cys | Thr | Val | Met | Leu |
|     |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Phe | Trp | Trp | Asn | Leu | Gln | Val | Met | Phe | Met | Tyr | Lys | Ala | Thr | Ile | Asp |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Gln | Asn | Arg | Asn | Tyr | His | Leu | Ile | Ser | Ile | Leu | Pro | Cys | Phe | Lys | Lys |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Lys | Lys | Lys |     |     |     |     |     |     |     |     |     |     |     |     |     |
|     |     |     | 355 |     |     |     |     |     |     |     |     |     |     |     |     |

<210> 19  
 <211> 796  
 <212> DNA  
 <213> Glycine max

<220>  
 <221> CDS

<222> (1) ... (513)

<400> 19

gca cga gca atg gcg gga gtg agg gaa cag gac cag tac atg ccg ata 48  
Ala Arg Ala Met Ala Gly Val Arg Glu Gln Asp Gln Tyr Met Pro Ile  
1 5 10 15

gcg aac gtg ata agg atc atg cgt cgg att ctg cca gcg cac gcg aag 96  
Ala Asn Val Ile Arg Ile Met Arg Arg Ile Leu Pro Ala His Ala Lys  
20 25 30

atc tca gac gac gcg aag gag acg atc cag gag tgc gtg tct gag tac 144  
Ile Ser Asp Asp Ala Lys Glu Thr Ile Gln Glu Cys Val Ser Glu Tyr  
35 40 45

atc agt ttc atc acg gcg gag gcg aac gag cgg tgc cag cgg gag cag 192  
Ile Ser Phe Ile Thr Ala Glu Ala Asn Glu Arg Cys Gln Arg Glu Gln  
50 55 60

cgg aag acg gtg acc gca gag gat gtg ttg tgg gcg atg gag aag ctt 240  
Arg Lys Thr Val Thr Ala Glu Asp Val Leu Trp Ala Met Glu Lys Leu  
65 70 75 80

ggc ttt gac aac tac gct cac cct ctc tct ctt tac ctt cac cgc tac 288  
Gly Phe Asp Asn Tyr Ala His Pro Leu Ser Leu Tyr Leu His Arg Tyr  
85 90 95

cgc gag agt gaa gga gaa cct gct tct gtc aga cgc gct tct tct gca 336  
Arg Glu Ser Glu Gly Glu Pro Ala Ser Val Arg Arg Ala Ser Ser Ala  
100 105 110

atg ggg atc aat aat aat atg gtg cac cca cct tat att aat tct cat 384  
Met Gly Ile Asn Asn Asn Met Val His Pro Pro Tyr Ile Asn Ser His  
115 120 125

ggc ttt gga atg ttt gat ttt gac cca tca tcg caa ggg ttt tac agg 432  
Gly Phe Gly Met Phe Asp Phe Asp Pro Ser Ser Gln Gly Phe Tyr Arg  
130 135 140

gac gat cat aac gct gct tct gga tct ggt ggt ttt gtt gcg cct ttt 480  
Asp Asp His Asn Ala Ala Ser Gly Ser Gly Gly Phe Val Ala Pro Phe  
145 150 155 160

gat cct tat gct aac atc aaa cgt gat gcc ctg tgatcatgta agaacaacaa 533  
Asp Pro Tyr Ala Asn Ile Lys Arg Asp Ala Leu  
165 170

ctagtgcattg ctgcttttttc acttggttag ttatatattcaa gcacaagcac atgcaggtgc 593  
agctgcaact atttagcttc atctacaaat ctttttttct ctcttcttct catgctttaa 653  
ttatttagag acaatacttg ttattcattg ttatgctcaa ttgctagctt ctattcatcg 713  
tcgactgtct gtattgttga tggttcattac agtaacagat aagatggtaa ctgctttact 773  
acttcaaaaaa aaaaaaaaaa aaa 796

<210> 20

<211> 171

<212> PRT

<213> Glycine max

<400> 20

Ala Arg Ala Met Ala Gly Val Arg Glu Gln Asp Gln Tyr Met Pro Ile  
1 5 10 15  
Ala Asn Val Ile Arg Ile Met Arg Arg Ile Leu Pro Ala His Ala Lys

|   |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|
|   | 20  |     | 25  |     | 30  |
| Ile Ser Asp Asp Ala Lys Glu Thr Ile Gln Glu Cys Val Ser Glu Tyr |     |     |     |     |     |
|   | 35  |     | 40  |     | 45  |
| Ile Ser Phe Ile Thr Ala Glu Ala Asn Glu Arg Cys Gln Arg Glu Gln |     |     |     |     |     |
|   | 50  |     | 55  |     | 60  |
| Arg Lys Thr Val Thr Ala Glu Asp Val Leu Trp Ala Met Glu Lys Leu |     |     |     |     |     |
|   | 65  |     | 70  |     | 75  |
| Gly Phe Asp Asn Tyr Ala His Pro Leu Ser Leu Tyr Leu His Arg Tyr |     |     |     |     |     |
|   |     | 85  |     | 90  | 95  |
| Arg Glu Ser Glu Gly Glu Pro Ala Ser Val Arg Arg Ala Ser Ser Ala |     |     |     |     |     |
|   | 100 |     | 105 |     | 110 |
| Met Gly Ile Asn Asn Asn Met Val His Pro Pro Tyr Ile Asn Ser His |     |     |     |     |     |
|   | 115 |     | 120 |     | 125 |
| Gly Phe Gly Met Phe Asp Phe Asp Pro Ser Ser Gln Gly Phe Tyr Arg |     |     |     |     |     |
|   | 130 |     | 135 |     | 140 |
| Asp Asp His Asn Ala Ala Ser Gly Ser Gly Gly Phe Val Ala Pro Phe |     |     |     |     |     |
|   | 145 |     | 150 |     | 155 |
| Asp Pro Tyr Ala Asn Ile Lys Arg Asp Ala Leu                     |     |     |     |     | 160 |
|   |     | 165 |     | 170 |     |

<210> 21  
 <211> 1098  
 <212> DNA  
 <213> Triticum aestivum

<220>  
 <221> CDS  
 <222> (55)...(894)

|   |             |
|---|-------------|
| <400> 21  |             |
| gcacgagcaa gtgcgagtgc gactacctgc attgcacctt ggctagccct agac atg | 57          |
|   | Met         |
|   | 1           |
| gag aac gac ggc gtc ccc aac gga cca gcg gcg ccg gca cct acc cag | 105         |
| Glu Asn Asp Gly Val Pro Asn Gly Pro Ala Ala Pro Ala Pro Thr Gln |             |
|   | 5 10 15     |
| ggg acg ccg gtg gtg cgg gag cag gac cgg ctg atg ccg atc gcg aac | 153         |
| Gly Thr Pro Val Val Arg Glu Gln Asp Arg Leu Met Pro Ile Ala Asn |             |
|   | 20 25 30    |
| gtg atc cgc atc atg cgc cgt gcg ctc cct gcc cac gcc aag atc tcc | 201         |
| Val Ile Arg Ile Met Arg Arg Ala Leu Pro Ala His Ala Lys Ile Ser |             |
|   | 35 40 45    |
| gac gac gcc aag gag gcg att cag gaa tgc gtg tcc gag ttc atc agc | 249         |
| Asp Asp Ala Lys Glu Ala Ile Gln Glu Cys Val Ser Glu Phe Ile Ser |             |
|   | 50 55 60 65 |
| ttc gtc acc ggc gag gcc aac gaa cgg tgc cgc atg cag cac cgc aag | 297         |
| Phe Val Thr Gly Glu Ala Asn Glu Arg Cys Arg Met Gln His Arg Lys |             |
|   | 70 75 80    |
| acc gtc aac gcc gaa gac atc gtg tgg gcc cta aac cgc ctc ggc ttc | 345         |
| Thr Val Asn Ala Glu Asp Ile Val Trp Ala Leu Asn Arg Leu Gly Phe |             |
|   | 85 90 95    |
| gac gac tac gtc gtg ccc ctc agc gtc ttc ctg cac cgc atg cgc gac | 393         |
| Asp Asp Tyr Val Val Pro Leu Ser Val Phe Leu His Arg Met Arg Asp |             |
|   | 100 105 110 |



ccc gag gcg ggg aca ggt ggt gcc gct gca ggc gac agc cgc gcc gtg 441  
 Pro Glu Ala Gly Thr Gly Gly Ala Ala Ala Gly Asp Ser Arg Ala Val  
 115 120 125  
 acg agt gcg cct ccc cgc gcg gcc ccg ccc gtg atc cac gcc gtg ccg 489  
 Thr Ser Ala Pro Pro Arg Ala Ala Pro Pro Val Ile His Ala Val Pro  
 130 135 140 145  
 ctg cag gct cag cgc ccg atg tac gcg ccc ccg gct ccg ttg cag gtt 537  
 Leu Gln Ala Gln Arg Pro Met Tyr Ala Pro Pro Ala Pro Leu Gln Val  
 150 155 160  
 gag aat cag atg cag cgg cct gtg tac gct ccc ccg gct ccg gtg cag 585  
 Glu Asn Gln Met Gln Arg Pro Val Tyr Ala Pro Pro Ala Pro Val Gln  
 165 170 175  
 gtt cag atg cag cgg gcc atc tat ggg ccc cgg gct cca gtg cac ggg 633  
 Val Gln Met Gln Arg Gly Ile Tyr Gly Pro Arg Ala Pro Val His Gly  
 180 185 190  
 tac gcc gtc gga atg gcg ccc gtg cgg gcc aac gtc gcc ggg cag tac 681  
 Tyr Ala Val Gly Met Ala Pro Val Arg Ala Asn Val Gly Gly Gln Tyr  
 195 200 205  
 cag gtg ttc gcc gga gag ggt gtc atg gcc cag caa tac tac ggg tac 729  
 Gln Val Phe Gly Gly Glu Gly Val Met Ala Gln Gln Tyr Tyr Gly Tyr  
 210 215 220 225  
 ggg tac gag gaa gga gcg tac gcc gca ggt agc agc aac gga gga gcc 777  
 Gly Tyr Glu Glu Gly Ala Tyr Gly Ala Gly Ser Ser Asn Gly Gly Ala  
 230 235 240  
 gcc att gcc gac gag gag agc tcg tcc aac gcc gtg ccg gca ccg ggg 825  
 Ala Ile Gly Asp Glu Glu Ser Ser Ser Asn Gly Val Pro Ala Pro Gly  
 245 250 255  
 gag gcc atg ggg gag cca gag cca gag cca gca gca gaa gaa tcg cat 873  
 Glu Gly Met Gly Glu Pro Glu Pro Glu Pro Ala Ala Glu Glu Ser His  
 260 265 270  
 gac aag ccc gtc caa tct gcc tagtcgcgtg cgcggcgcgc gttagcttct 924  
 Asp Lys Pro Val Gln Ser Gly  
 275 280  
 gcgtcctgtg tactgtaata atttgccgtg tcgatccggc catggtttgt gtgtgcgtag 984  
 tgcttatcta atgtgggctt gtcctctagt aattcatgta ttgcttatct aatgtggact 1044  
 tgctcctctag taattcatgt actctttgct gttgaaaaaa aaaaaaaaaa aaaa 1098

<210> 22  
 <211> 280  
 <212> PRT  
 <213> Triticum aestivum

<400> 22  
 Met Glu Asn Asp Gly Val Pro Asn Gly Pro Ala Ala Pro Ala Pro Thr  
 1 5 10 15  
 Gln Gly Thr Pro Val Val Arg Glu Gln Asp Arg Leu Met Pro Ile Ala  
 20 25 30  
 Asn Val Ile Arg Ile Met Arg Arg Ala Leu Pro Ala His Ala Lys Ile  
 35 40 45  
 Ser Asp Asp Ala Lys Glu Ala Ile Gln Glu Cys Val Ser Glu Phe Ile  
 50 55 60

Ser Phe Val Thr Gly Glu Ala Asn Glu Arg Cys Arg Met Gln His Arg  
 65 70 75 80  
 Lys Thr Val Asn Ala Glu Asp Ile Val Trp Ala Leu Asn Arg Leu Gly  
 85 90 95  
 Phe Asp Asp Tyr Val Val Pro Leu Ser Val Phe Leu His Arg Met Arg  
 100 105 110  
 Asp Pro Glu Ala Gly Thr Gly Gly Ala Ala Ala Gly Asp Ser Arg Ala  
 115 120 125  
 Val Thr Ser Ala Pro Pro Arg Ala Ala Pro Pro Val Ile His Ala Val  
 130 135 140  
 Pro Leu Gln Ala Gln Arg Pro Met Tyr Ala Pro Pro Ala Pro Leu Gln  
 145 150 155 160  
 Val Glu Asn Gln Met Gln Arg Pro Val Tyr Ala Pro Pro Ala Pro Val  
 165 170 175  
 Gln Val Gln Met Gln Arg Gly Ile Tyr Gly Pro Arg Ala Pro Val His  
 180 185 190  
 Gly Tyr Ala Val Gly Met Ala Pro Val Arg Ala Asn Val Gly Gly Gln  
 195 200 205  
 Tyr Gln Val Phe Gly Gly Glu Gly Val Met Ala Gln Gln Tyr Tyr Gly  
 210 215 220  
 Tyr Gly Tyr Glu Glu Gly Ala Tyr Gly Ala Gly Ser Ser Asn Gly Gly  
 225 230 235 240  
 Ala Ala Ile Gly Asp Glu Glu Ser Ser Ser Asn Gly Val Pro Ala Pro  
 245 250 255  
 Gly Glu Gly Met Gly Glu Pro Glu Pro Glu Pro Ala Ala Glu Glu Ser  
 260 265 270  
 His Asp Lys Pro Val Gln Ser Gly  
 275 280

<210> 23  
 <211> 65  
 <212> PRT  
 <213> Artificial Sequence  
  
 <220>  
 <223> LEC1 consensus protein sequence  
  
 <221> VARIANT  
 <222> (1)...(65)  
 <223> Xaa = Any Amino Acid

<400> 23  
 Arg Glu Gln Asp Xaa Xaa Met Pro Ile Ala Asn Val Ile Arg Ile Met  
 1 5 10 15  
 Arg Xaa Xaa Leu Pro Xaa His Ala Lys Ile Ser Asp Asp Ala Lys Glu  
 20 25 30  
 Xaa Ile Gln Glu Cys Val Ser Glu Tyr Ile Ser Phe Xaa Thr Xaa Glu  
 35 40 45  
 Ala Asn Xaa Arg Cys Xaa Xaa Xaa Arg Lys Thr Xaa Xaa Xaa Glu  
 50 55 60  
 Xaa  
 65